PREFACE

Designing for ownership in technology-enhanced learning (TEL): a core element for learners' SRL and agency

1. Theoretical and empirical background

Psychological ownership is a concept describing a relationship between a person and an object in which the object is experienced as "connected with the self" [1] and/or becomes a part of an "extended self' [2]. Psychological ownership in context of learning and education is rooted in Self-Regulated Learning, SRL [3] and has been viewed as an essential component in the development of metacognitive and critical thinking skills [4]. Psychological ownership has received increased attention in different fields of research, including organisational development and leadership, education and consumer behaviour [5,46]. A number of authors have addressed the links between psychological ownership and self-identity, self-adjustment, accountability, sense of belonging and citizenship [5,6]. Psychological ownership has been viewed as a positive resource for attitudes (e.g. higher commitment, responsibility), self-esteem, self-efficacy, motivation, accountability, performance and self-identity [5-8]. The theory of psychological ownership considers ownership as a multi-dimensional construct encompassing (1) sense of responsibility, (2) sense of identity, (3) sense of accountability, (4) sense of self-efficacy and (5) sense of belongingness [6].

Psychological ownership has been studied in relation to physical entities, e. g. house, and non-physical entities, e. g. ideas [8] and in relation to tangible elements of a learning environment, e. g. technology, and intangible elements, e. g. data [9]. Studies on psychological ownership have been focused on understanding the nature of psychological ownership and related concepts such as control, accountability and identity, and the effects of psychological ownership on learning and performance in online learning [10,11].

The concept of ownership in context of learning and education has been studied in relation to physical learning environments [12], individualized education programs [13], student-directed planning of learning processes [14], professional communities of teachers [15], service learning [16], teacher education [17], group projects and effective leadership in groups [18], collaborative writing [19] and perceived learning [20], formative assessment [21], learning contracts [22], academic readiness [23], formative assessment [24], formative instructional practices [25], laboratory courses [26], often in relation to student engagement and student performance.

Ownership has a close relationship with other related themes such as self-regulated learning and agency, both of which have received a growing interest in recent years. In particular, self-efficacy is a particular common element in all three -see for example, the models of SRL by Zimmerman [27] and higher education students' agency by Jääskelä, Poikkeus, Vasalampi, Valleala and Rasku-Pustonen [28].

The question of ownership and control has been also explored in the field of technology enhanced learning, especially in learner-centered approaches to learning designs. The shift towards greater learner control and ownership has been especially

discussed in relation to Personal Learning Environments and the changes in ownership and control in comparison to previous educational approaches to the use of technologies for learning [29-31] and diverse aspects related to ownership such as ownership and control [9], ownership and culture [11], and ownership and privacy [32] in Personal Learning Environments (PLEs). Ownership in technology-enhanced learning has been also discussed in relation to ownership and access in online learning environments [33], Blended Learning Environments [34], personalised support in the use of the Learning Management System (LMS) [35], learning with electronic texts and navigation aids [36], mobile learning [37], personalised learning in Web 2.0 [38], e-portfolio and social learning [39], use of iPad for active reading in academic setting [40], digital logs of teachers [41] and Computer-Assisted Language Learning [42].

Despite existing literature, empirical research on ownership in content of technology enhanced learning is very scarce and the current state of research provides little clarity about how ownership in technology-enhanced learning and in consequence the quality of learning outcomes can be fostered through learning design. Perceiving oneself as owning learning is a challenging aim that may support and be supported by self-regulation beliefs and one's own agency whether at an individual, relational or contextual level [28] and more research is needed to support such a statement and the implications for learning in technology enhanced environments. The literature is also very scarce when it comes to measures and scales for psychological ownership in technology-enhanced learning. There is a need for validated research instruments which can be applied in further studies. Moreover, a comprehensive overview of the diverse theories and models of ownership which can be applied to the study of ownership in technology enhanced learning has been missing, making the landscape of research in this field scattered and obscure. This Special Issue is a contribution to the field.

2. Articles in this Special Issue

Articles in this special issue address ownership in TEL from the perspective of the teacher roles, the learning design and the importance of facilitating student opportunity to develop self-regulated skills and to enact agency. This approach to the role of the teacher as the designer of learning in technology-enhanced learning [43-44] has been observed by authors of all papers, including two articles in which ownership is explored in the context of adaptive systems (Rajagopal et al.,; Durall, Virnes, Leinonel, & Gros). In general, this allows us to suggest a very appealing conclusion about the focus on psychological ownership in TEL which seems to be closely related to processes enhanced by the teacher, both in the stage of designing learning and in the stage of monitoring learning.

The approaches addressed in this thematic special issue reveal some key elements for the current landscape of ownership for self-regulated learning and agency in technology-enhanced learning. First of all, it can be seen that articles suggest both benefits and challenges for all educational levels from K-12 education (Rajagopal et al.) to higher education (Buchem, Tur, & Hoelterhoff; Marín, De Benito, & Darder; Rodés & Gewerc) and other informal learning contexts like MOOCs (Barberà, Garcia, & Maina). Second, the relationship of ownership with self-regulated learning and agency has gained special interest under the umbrella of Open Education, in particular, in the context of MOOCs (Barberà, Garcia, & Maina) and Open Educational Resources

(OER) (Rodés & Gewer). Data collected in the empirical study by Buchem, Tur, & Hoelterhoff suggests that the use of social media tools in education may impact ownership in a positive way. Third, ownership seems to be related to learning designs in adaptive learning environments (Durall, Virnes, Leinonen, & Gros; Rajagopal et al.), and seems to be enriched through iterative, collaborative and participative joint processes like the design-based research methodology (Rajagopal et al.; Barberà, Garcia, & Maina) and the research-based design (Durall et al.). Last but not least, this special issue includes two literature reviews focusing on agency in technology-enhanced learning (Marín, De Benito, & Darder; Castañeda & Tur). Marín, De Benito and Darder develop a model of dimensions of student agency whereas Castañeda and Tur explore educational experiences in context of Personal Learning Environments (PLE) under the lens of the agency framework and recurrent learning design patterns. Both articles point out that the experiences included in their reviews mostly stem from specific cultural contexts (mainly Western and English-speaking countries), warn against digital neocolonialism [45] and emphasise the need for further work in the area, which would include other sociocultural perspectives on designing for ownership in technology-enhanced learning.

The following sections provide summaries of all articles in this Special Issue. The articles were grouped according to their thematic focus into (1) Literature Reviews, (2) Learning Designs and (3) Learning Systems.

2.1 Literature reviews

This special issue includes two literature reviews focusing on agency in technology-enhanced learning (Marín, De Benito, & Darder; Castañeda & Tur). Marín, De Benito and Darder present a literature review to lay the foundation of the relationship between the development of students' agency and technology-enhanced learning. In order to do that, authors first link their approach to three concepts: student's agency as the construct made up of three components: personal, relational and participatory resources (as defined by [28]). Then, the technology-enhanced environment is explored in relation to the potential of Web 2.0 to enhance control and ownership. In this regard, the authors explore two models that inform the learning design with elements connected through social relations and mediated by technology. The authors observe the need to include the design of the physical situation, the tasks and the social situation, based on the ACAD framework. The third aspect is related to the construction of the identity of teachers as transformative agents, which the authors consider as a requirement for innovative TEL designs. The authors follow the PRISMA protocol to carry out their literature review and arrive at a selection of 29 articles, which are discussed and coded to meet their two research aims. The authors draw an emergent concept of student agency and define the main characteristics of learning settings. Marín, De Benito and Darder suggest a model with six categories that mediates the relationship between the student agency and TEL on the micro-level of the learning design. In this model, the authors observe that the elements related to processes and social relations are more frequent than those related to teaching, learning activities and assessment/feedback. Regarding the learners, the authors observe that specific TEL designs may be beneficial for student agency, ownership and self-regulated learning. Regarding assessment/feedback, the authors argue that it is mainly used to offer guidance but

rarely participatory feedback involved in activities of both self-assessment and co-assessment. With this work, the authors make a relevant contribution to international research and bridge the gap between research in student agency in higher education and in digital environments.

The literature review by Castañeda and Tur explores the enactment of agency in the context of Personal Learning Environments (PLE) and highlights the socio-material approach. The authors define PLEs as the educational approach in which the learner becomes the center. In this regard, PLEs include the use of social networks, the creation of Personal Learning Networks (PLNs), and innovative methodologies for lifelong learning, in which cognitive strategies, resources and technologies converge. The socio-technological description involves the enactment of the learner agency. Working out the conceptual construct of agency by [28] the authors explore the eleven most cited PLE-related pedagogical experiences in terms of their learning design for the enactment of student agency. The authors characterise the general settings of the current scenarios including higher education, blended learning, social and educational science. The analysis of the pedagogical experiences in terms of their agentic design shows a clear predominance of the individual resources, which are enacted in all designs. In this regard, participation as a learning activity seems to be most frequent, and is related to performance and engagement, content production and reflective learning. Participation is observed as the demonstration of the responsibility to fulfill tasks and arises from PLE ownership. As for relational agency, social media emerges as the mediator with implications to distribute power relationships between teachers and students and to provide feedback among different agents with remarkable enhancement of peer support. Among the resources to enact agency in terms of contextual resources, the possibility to allow students' choice is the most frequent element observed among the eleven studies analysed. Choices are incentivized from different approaches mainly from choosing tools, and personal networks, whereas the opportunity to choose learning objectives is less frequent. Among all the PLE-related experiences, e-portfolios seem to have a complex role as they emerge as potential tools to enact agency as an individual resource for reflective practice, as a relational resource for peer to peer support and dialogic learning, and as a contextual resource for choice-making related to learning. With this work, the authors contribute to extending the knowledge of how to improve the design of PLE-based pedagogical experiences. Authors highlight that these designs, which are based on the use of social media, mainly involve individual and relational resources, whereas contextual ones are not optimised and greatly limited to owning tools. Thus, this analysis highlights the paradox of using social media without a special focus to enhance the choice over learning processes, like choosing aims or pathways to develop skills.

2.2. Learning Designs

The article by Virginia Rodés and Adriana Gewerc-Barujel addresses the adoption of OER by higher education teachers from a critical approach going beyond owning rights for intellectual property and the licenses for open sharing. The adoption of OER is described with a model that places teachers and the curriculum as core elements along with a post-colonial approach. In this sense, emotional ownership plays a key role and is considered to be developed in the OER creation process rather than in its use stages.

The study, which is carried out in the context of higher education in Latin American and with a qualitative approach including ethnographic methods, aims at analyzing the dimensions of the adoption of OER. The analysis of results shows a narrative of dimensions in which ownership and agency are intertwined. The authors emphasise the lack of institutional policy (with a few exceptions) for the creation of OER which eventually depends on the teachers' eagerness to push for teamwork and the creation of learning communities. The role of teachers as agents for the creation of contextualized content, the empowerment of curriculum and own professional development, situates them as innovation leaders. The iterative process of improving OERs is accompanied with reflective and transformative practices, which are related to emotional ownership and reappropriation. Teachers' attitudes related to the attribution of authorship and the care of resources is highly connected to emotional ownership but also to the critical perspective of the geopolitics and unbalanced distributed creation and reuse of OERs. The authors address the need for governments, international and national organizations to develop policies and capacity building to enhance teachers' ownership over the curriculum which will eventually facilitate the adoption of OER. With their work, the authors make a relevant and innovative contribution by discussing ownership from the perspective of OER adoption with a vision that allows to overcome the limited perspective of ownership in legal terms and extending it to emotional ownership and teachers' ownership of curriculum development.

The article by Barberà, Garcia and Fabián Maina presents research in which a layer for self-regulated learning has been added to a MOOC in order to foster learners' ownership and agency. The study employs a design based research approach in which a first phase consists of analysing scientific literature and self-regulated learning (SRL) in MOOCs. In the design phase, a set of prompts as a SRL layer is added to a MOOC on gamification, The design layer is implemented with the help of a tutor who ensured that students can understand and carry out tasks in the form of the prompts designed. A final stage of assessment is performed, in which data from four interviews with students who successfully completed the course is collected in order to be again discussed in a third co-design session. Finally, improvements are included in the SRL layer in MOOCs oriented towards psychological ownership. The article presents the results of the first layer of SRL and its improvement with the addition of what the authors call "regulation activators" which are defined in terms of psychological ownership, and which consist of the five dimensions of psychological ownership as defined by Pierce et al. [6,8]. Based on this, the authors identify a set of four "learning design effects" to be included in MOOCs which they describe as pre-guidelines that need to be tested in further empirical work. The authors recommend bringing the following elements of learning designs in relation: SRL processes; the personalization of learning; the technical infrastructure facilitating the regulatory process in itself; and the social aspects of learning. With this work, the authors contribute in extending knowledge in the field of learning designs for MOOCs with its challenges such as offering MOOCs to a great number of participants while at the same time offering personalized learning. The proposed design for the interplay between SRL and psychological ownership is a promising approach which may be beneficial to enhancing autonomous learning in MOOCs.

Buchem, Tur and Holterhof draw on the theory of psychological ownership and self-regulated learning, and explore the role of psychological ownership for self-

regulated learning in context of technology-enhanced learning. The study is conducted with students from four different courses at two universities in Germany and Spain. The research model employed in the study explains the route from perceived control of the learning environment to psychological ownership and from psychological ownership to self-regulated learning, drawing on previous research in Personal Learning Environments. The authors examine differences in learning designs in the four courses and explore how these may be related to different perceptions of control and ownership. This study helps to apply and extend the theory of psychological ownership to the field of technology-enhanced learning, specifically the application of e-portfolios in higher education. The study shows that self-regulated learning is affected by psychological ownership and perceived control of the learning environment according to the Antecedent-Consequences-Model of psychological ownership. This contribution provides evidence from research on the appropriateness of the model as well as insights into possible impact of different learning designs on perceived control, ownership and self-regulated learning. With this work, the authors provide a research model which links ownership and self-regulated learning and which can be applied in further research and in practical work of creating and implementing learning designs with e-portfolios to promote learner control, ownership and self-regulated learning. The authors recommend to explore differences in learning designs in a more systematic way in further studies, e. g. by employing experimental designs, as well as exploring possible differences item response behaviours in national groups.

2.3 Learning systems

Rajagopal, Van Schoors, Vanbecelaere, de Bie and Depaepe explore learner control, motivation and psychological ownership for personalizing learning in K12 levels with the implementation of i-Learn, a virtual environment that provides tools along with training and guidance for schools and teachers. Through a design based research approach, the authors present the first loop of research which includes the analysis of the context on adaptive systems through a literature review and focus groups interviews, the design and construction of the first prototype through a set of workshops with team members and other experts, and the preparation for the final assessment. Results from the first phase of the process show the importance perceived by teachers related to sharing the control of learning with students. However, the results also show that teachers prefer to retain control over the content and learning activities performed by students. The main difference related to control is that primary teachers consider it more important that students have access to feedback whereas secondary education teachers prefer to share control over all types and sources of information. In consequence, the prototype is developed based on the conjectures of allowing teacher-adapted learning pathways while at the same time leaving space for students' ownership by promoting metacognitive reflective processes. The authors develop a model for the future assessment of the i-Learn project in which psychological ownership is addressed through the discussion of diverse backgrounds and contexts. The authors highlight the need to develop a new scale which would focus on ownership for learning at non-university levels and take some particular characteristics into consideration, such as the importance of learner motivation, the difficulties to differentiate between given and perceived control institutional culture and transformational leadership. With this work,

the authors contribute not only in the development of an innovative product for education but also in extending knowledge by offering a rich framework which can support the development of psychological ownership in the context of learning at K-12 levels.

Durall, Virnes, Leinonen and Gros present the development of a self-monitoring system Feeler in which the aim is to enhance learning ownership and self-regulated learning while scaffolding students' reflection on generated data. The increasing uptake of self-monitoring technologies in formal education for personalizing learning requires a critical approach to issues such as data privacy concerns and surveillance along with challenging students' agency, disempowerment, as well as passivity and alienation of students. The authors emphasize the need for a critical approach to supporting self-regulated learning and suggest that the need of the democratization of technology stimulates participatory processes which enhance ownership. The authors present a participatory process of research-based design in which the aim is to develop a design prototype for self-monitoring psychological data to enhance self-regulated learning. The design process involves four stages (i. e. contextual inquiry participatory design, product and prototype design), which evolve from an ethnographic approach to co-design workshops, in which learning patterns, scenarios and personas were developed. The authors claim that this design approach allows to enhance ownership and to respond to students' concerns about privacy issues. The data collected suggests that the self-monitoring system Feeler supported learning ownership through self-regulated learning, the collection and visual representation of data supported learning awareness, which at the same time provoked the self-monitoring of learning. Self-reflection and self-assessment were also enhanced due to the fact that Feeler does not include recommendations for decision-making for further learning and so such decisions had to be taken by students. Participants developed learning strategies which in turn helped them to feel in control of both emotional and cognitive processes. Findings also suggest that the recording and visualization of data on students' performance helped in developing self-regulated learning skills, in particular by allowing causal attributions facilitating further reactions, and thus allowing to perform the whole self-regulatory learning cycle. With this work, the authors contribute to the international discussion on adaptive systems and provide insights into how these systems may be designed to enhance self-regulated learning, ownership and agency while tackling challenges related to unethical practices of learning analytics.

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